INTERNATIONAL BIWEEKLY ONLINE SEMINAR ON ANALYSIS, DIFFERENTIAL EQUATIONS AND MATHEMATICAL PHYSICS

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27 June 2024, 6 pm (UTC+3)

Instability theory of stationary kink and anti-kink profiles for the sine-Gordon equation on a Y-junction graph

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The purpose of this talk is to communicate recent results regarding the (in)stability theory of static solutions of kink and anti-kink type for the sine-Gordon equation posed on a Y-junction graph. The boundary conditions at the vertex are assumed to be of delta- or delta'-type. Applications of the model include the study of tri-crystal boundaries of Josephson junctions in superconductivity theory. It is shown that kink and kink/anti-kink soliton type stationary profiles are linearly (and nonlinearly) unstable. A linear instability criterion that provides the sufficient conditions on the linearized operator around the wave to have a pair of real positive/negative eigenvalues, is established. The linear stability analysis depends upon the spectral study of this linear operator and of its Morse index. The extension theory of symmetric operators, Sturm-Liouville oscillation results and analytic perturbation theory of operators are fundamental ingredients in the stability analysis. This is joint work with J. Angulo Pava (Univ. of Sao Paulo).

*Seminar website: https://msrn.sfedu.ru/sl. The seminar uses Microsoft Teams online platform.
Please send questions to ademp.seminar@gmail.com (Tatiana Andreeva, scientific secretary).

The seminar is organized by the coordinators Alexey Karapetyants and Vladislav Kravchenko within the activities of the Regional Mathematical Center of the Southern Federal University in collaboration with Institute of Mathematics, Mechanics and Computer Sciences of the Southern Federal University and the OTHA research group in Operator Theory and Harmonic Analysis.

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